BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 National Diploma in Engineering Pearson BTEC International Level 3 National Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 National Extended Diploma in Engineering Pearson BTEC International Level 3 National Extended Diploma in Electrical/Electronic Engineering
Unit number and title	**Unit 23: Digital and Analogue Electronic Systems**
Learning aim(s)	**B:** Explore the characteristics of analogue, digital and mixed electronic systems and the role of signal conversion in control applications
Assignment title	Exploration of complex analogue and digital systems
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	Your Supervisor and the Senior Field Service Technician are pleased with your progress and with the way you have approached the tasks they have set you. They have suggested that it would be a good idea for you to build up a logbook of circuits and typical signal values that you can refer to when you are working on customer equipment. This should help you identify where faults occur and speed up your response time on-site.

Task 1	You have been asked to carry out a series of practical exercises investigating the block structure of, and signal flow in, complex analogue, digital and mixed electronic systems, which incorporate signal conversion. **To do this:** Your tutor will provide you with a number of pre-built complex analogue and digital systems that you need to investigate. You need to: a) Arrange the supplied schematic diagrams of complex analogue and digital circuits as block diagrams, identifying sub-systems b) Use the schematic and block diagrams to identify key test points to determine the correct operational value of signals. c) Use test equipment (at least digital multimeter, dual trace oscilloscope, function generator, logic probe, frequency meter) appropriately to safely to carry out functional testing of the supplied complex analogue and digital systems to measure the key signals identified in b). d) Record all your measurements systematically.

	You then need to: Set up and note the operation of a number of given systems incorporating analogue to digital and digital to analogue conversion. You need to: a) Investigate and write a report on the construction and operation of types of ADC; and b) Investigate and write a report on the construction and operation of types of ADC. To do this you will need to: a) Set up an Analogue to Digital Converter (ADC) to sample a sinusoidal signal. You will need to note the effect of: • analogue voltage input range • resolution • quantisation error • linearity. • sampling rate • aliasing as a consequence of under-sampling rate. b) Set up a Digital to Analogue Converter (DAC) to produce a saw tooth waveform. Note the effect on: • resolution • linearity. • Offset
Checklist of evidence required	A log book summarising practical experiment and reports exploring the sub-systems that make up complex analogue and digital systems, the measurement of signal flow through them, and the use of signal converters in mixed electronic systems. The evidence should be supported by one or more Observation Reports.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
23/B.D2	Evaluate the structure and operation of an analogue, a digital and a mixed electronic system incorporating signal conversion in open- and closed-loop control systems, using safely obtained test results and theoretical calculations.
23/B.M2	Measure signals accurately at selected test points, in the three systems incorporating signal conversion.
23/B.M3	Analyse, using theoretical calculations and test results, the structure and operation of the three systems that includes signal conversion.
23/B.P4	Measure signals safely in an analogue, a digital, and a mixed electronic system that includes signal conversion.
23/B.P5	Explain, using theoretical calculations and test results, the structure and operation of an analogue, a digital, and a mixed electronic system incorporating signal conversion.

Sources of information to support you with this Assignment	Books Electronics: A systems approach; Storey N; Prentice Hall (2013); ISBN-13: 978-0273773276 Practical Electronics for Inventors; Scherz P Monk S; McGraw-Hill Education TAB (2016); ISBN-13: 978-1259587542 Electronics; Sparkes JJ et al; Nelson Thornes Ltd (2003); ISBN 0 7487 7036 4 Electronic devices; Floyd T L; Pearson (2007); ISBN-13: 978-0136155812 Digital fundamentals; Floyd T L; Pearson (2015); ISBN-13: 978-1292075983 BTEC Nationals Engineering Student Book + Activebook: For the 2016 Specifications (BTEC Nationals Engineering 2016); Buckenham A et al; Pearson Education (2016); ISBN-13: 978-1292141008 Websites http://www.electronics-tutorials.ws/ Further useful resources may be found at http://qualifications.pearson.com/en/support/published-resources.html#step1